

CLAIMS

1. A stable calcium phosphate complex including phosphopeptide stabilized amorphous calcium fluoride phosphate or a derivative thereof wherein said phosphopeptide includes the amino acid sequence Ser(P)-Ser(P)-Ser(P)-Glu-Glu.
2. A complex according to claim 1 wherein the calcium fluoride phosphate has the approximate formula $[Ca_8(PO_4)_5 \cdot x H_2O]$ wherein $x \geq 1$.
3. A complex according to claim 2 further including HPO_4 .
4. A complex according to any one of claims 1 to 3 wherein said phosphopeptide includes an amino acid sequence selected from any one of:
- [1] Gln⁵⁹-Met-Glu-Ala-Glu-Ser(P)-Ile-Ser(P)-Ser(P)-Ser(P)-Glu-Glu-Ile-Val-Pro-Asn-Ser(P)-Val-Glu-Gln-Lys⁷⁹. $\alpha_{51}(59-79)$
- [2] Arg¹-Glu-Leu-Glu-Glu-Leu-Asn-Val-Pro-Gly-Glu-Ile-Val-Glu-Ser(P)-Leu-Ser(P)-Ser(P)-Ser(P)-Glu-Glu-Ser-Ile-Thr-Arg²⁵. $\beta(1-25)$
- [3] Asn⁴⁶-Ala-Asn-Glu-Glu-Glu-Tyr-Ser-Ile-Gly-Ser(P)-Ser(P)-Ser(P)-Glu-Glu-Ser(P)-Ala-Glu-Val-Ala-Thr-Glu-Glu-Val-Lys⁷⁰. $\alpha_{42}(46-70)$
- [4] Lys¹-Asn-Thr-Met-Glu-His-Val-Ser(P)-Ser(P)-Ser(P)-Glu-Glu-Ser-Ile-Ile-Ser(P)-Gln-Glu-Thr-Tyr-Lys²¹. $\alpha_{42}(1-21)$.
5. A complex according to any one of claims 1 to 3 wherein said phosphopeptide includes the amino acid sequence:
- Gln⁵⁹-Met-Glu-Ala-Glu-Ser(P)-Ile-Ser(P)-Ser(P)-Ser(P)-Glu-Glu-Ile-Val-Pro-Asn-Ser(P)-Val-Glu-Gln-Lys⁷⁹. $\alpha_{51}(59-79)$.
6. A complex according to any one of claims 1 to 5 having a pH of about 7.0 to 9.0.
7. A stable soluble alkaline calcium phosphate complex including phosphopeptide stabilized amorphous calcium phosphate or a derivative thereof wherein said phosphopeptide includes the amino acid sequence Ser(P)-Ser(P)-Ser(P)-Glu-Glu.
8. A complex according to claim 7 wherein said amorphous calcium phosphate is of the approximate formula $[Ca_3(PO_4)_2 \cdot x H_2O]$ wherein $x \geq 1$.

9. A complex according to claim 8 further including HPO_4 .

10. A complex according to ~~any one of claims 7 to 9~~ wherein said phosphopeptide includes an amino acid sequence selected from any one of:

- [1] $\text{Gln}^{59}\text{-Met-Glu-Ala-Glu-Ser(P)-Ile-Ser(P)-Ser(P)-Glu-Glu-Ile-Val-Pro-Asn-Ser(P)-Val-Glu-Gln-Lys}^{79}$. $\alpha_{51}(59-79)$
- [2] $\text{Arg}^1\text{-Glu-Leu-Glu-Glu-Leu-Asn-Val-Pro-Gly-Glu-Ile-Val-Glu-Ser(P)-Leu-Ser(P)-Ser(P)-Ser(P)-Glu-Glu-Ser-Ile-Thr-Arg}^{25}$. $\beta(1-25)$
- [3] $\text{Asn}^{46}\text{-Ala-Asn-Glu-Glu-Glu-Tyr-Ser-Ile-Gly-Ser(P)-Ser(P)-Ser(P)-Glu-Ser(P)-Ala-Glu-Val-Ala-Thr-Glu-Glu-Val-Lys}^{70}$. $\alpha_{42}(46-70)$
- [4] $\text{Lys}^1\text{-Asn-Thr-Met-Glu-His-Val-Ser(P)-Ser(P)-Ser(P)-Glu-Glu-Ser-Ile-Ile-Ser(P)-Gln-Glu-Thr-Tyr-Lys}^{21}$. $\alpha_{52}(1-21)$

11. A complex according to ~~any one of claims 7 to 9~~ wherein said phosphopeptide includes the amino acid sequence:

$\text{Gln}^{59}\text{-Met-Glu-Ala-Glu-Ser(P)-Ile-Ser(P)-Ser(P)-Ser(P)-Glu-Glu-Ile-Val-Pro-Asn-Ser(P)-Val-Glu-Gln-Lys}^{79}$. $\alpha_{51}(59-79)$.

12. A complex according to ~~any one of claims 7 to 11~~ having the formula $[(\text{PP})(\text{CP})_8]_n$ where n is equal to or greater than 1.

13. A complex according to ~~any one of claims 7 to 12~~ having the formula $[(\text{PP})(\text{CP})_8]_6$.

14. A complex according to ~~any one of claims 7 to 10~~ having a pH of about 9.0.

15. A method of producing a stable alkaline calcium phosphate complex according to ~~any one of claims 1 to 14~~ including the steps of:

- (i) obtaining a solution of phosphopeptide having a pH of about 9.0;
- (ii) admixing (i) with solutions comprising calcium, and inorganic phosphate and optionally fluoride at a pH of about 9.0;
- (iii) filtering the mixture resulting from step (ii), and
- (iv) ~~drying to obtain the said complex.~~

16. A complex according to ~~any one of claims 1 to 14~~ produced in accordance with the method of claim 15.

17. A delivery vehicle adapted to co-localise ions including calcium, fluoride and phosphate ions at a target site, said delivery vehicle including as an active ingredient, the complex of ~~any one of claims 1 to 14 or 16.~~

18. A delivery vehicle of claim 17 ~~being any one of~~ toothpaste, toothpowder, liquid dentifrice, mouthwash, troches, chewing gum, dental paste, gingival massage cream, gargle tablets, dairy products and other foodstuffs.

19. A pharmaceutical composition including a complex according to ~~any one of claims 1 to 14 or 16~~ in combination with a pharmaceutical carrier.

20. An anticariogenic composition including the composition of claim ~~19 or the delivery vehicle according to claim 17 or 18 adapted for anticariogenic use.~~

21. A therapeutic composition including the composition of claim 19 adapted for therapeutic use.

22. A dietary supplement including a complex according to ~~any one of claims 1 to 14 or 16.~~

23. A dietary supplement according to claim 22 wherein said complex comprises 0.1 to 100% w/w of said supplement.

24. A dietary supplement according to claim 22 wherein said complex comprises 2% w/w of said supplement.

25. ~~A method of treating or preventing dental caries or tooth decay including the step of administering a complex according to any one of claims 1 to 14 or 16 to the teeth or gums of a subject in need of such treatment.~~

26. A method according to claim 25 including the topical administration of said complex.

27. ~~A method of treating one or more conditions related to calcium loss from the body including bones, calcium deficiency, calcium malabsorption or the like including the administration of a complex according to any one of claims 1 to 14 or 16 to a subject in need of such treatment.~~

28. The method of claim 27 wherein said condition includes

~~osteoporosis and osteomalacia~~

29. A ~~complex~~ according to any one of claims 1 to 14 or 16 as
hereinbefore described.

30. A delivery vehicle according to claim 17 or 18 as hereinbefore
described.

5 31. A pharmaceutical composition according to claim 19 as
hereinbefore described.

32. An anticariogenic composition according to claim 20 as
hereinbefore described.

10 33. A therapeutic composition according to claim 21 as hereinbefore
described.

34. A dietary supplement according to any one of claims 22 to 24 as
hereinbefore described.

35. A method of treatment according to any one of claims 25 to 28
substantially as hereinbefore described.

15 36. A method according to claim 8 substantially as hereinbefore
described.

add B1

add C¹⁸

add
D8

add E14

add G21